

Revealing the complex network of PAH formation pathways

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FELIX

Free Electron Lasers for
Infrared eXperiments

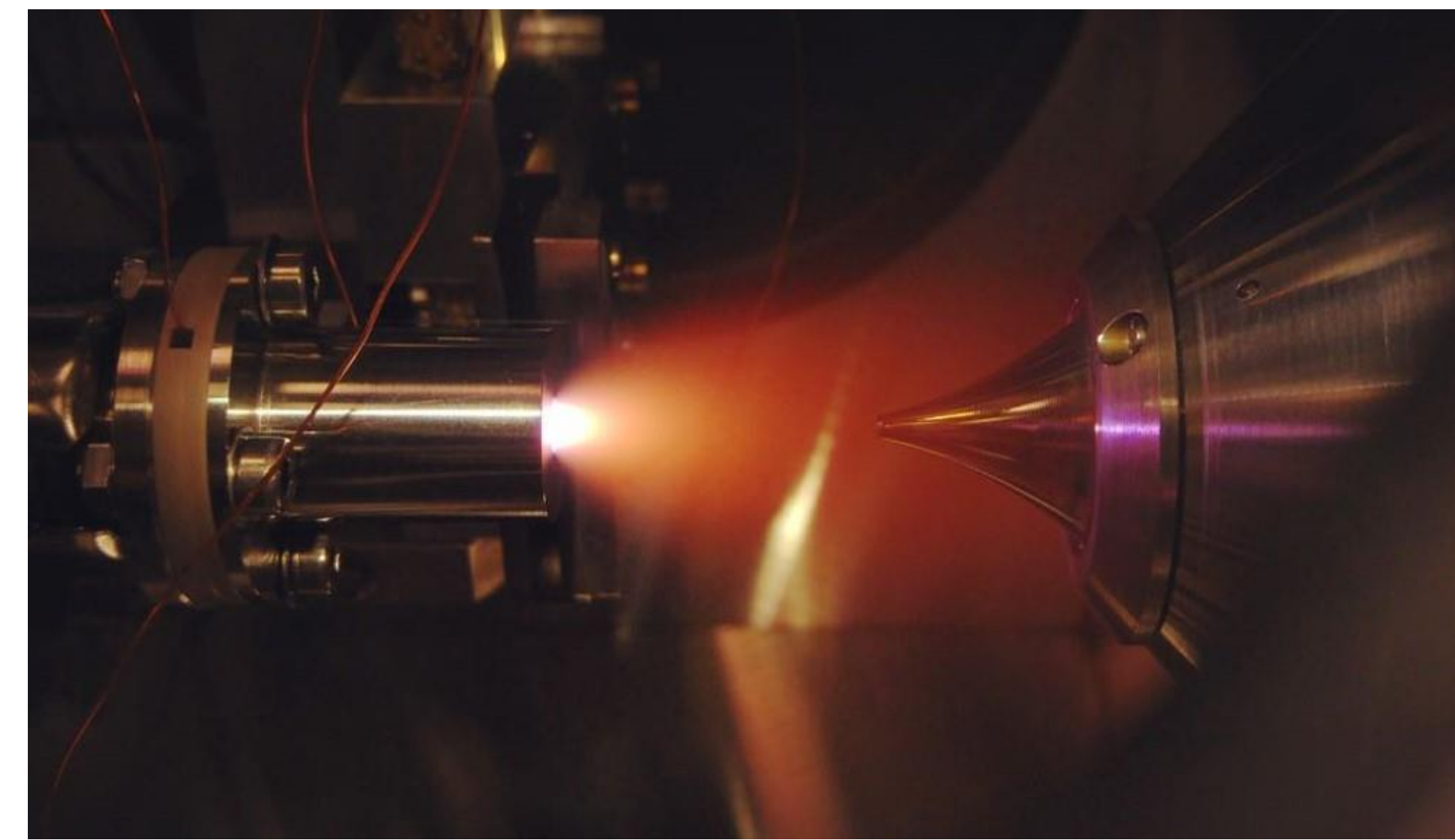
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INTRODUCTION

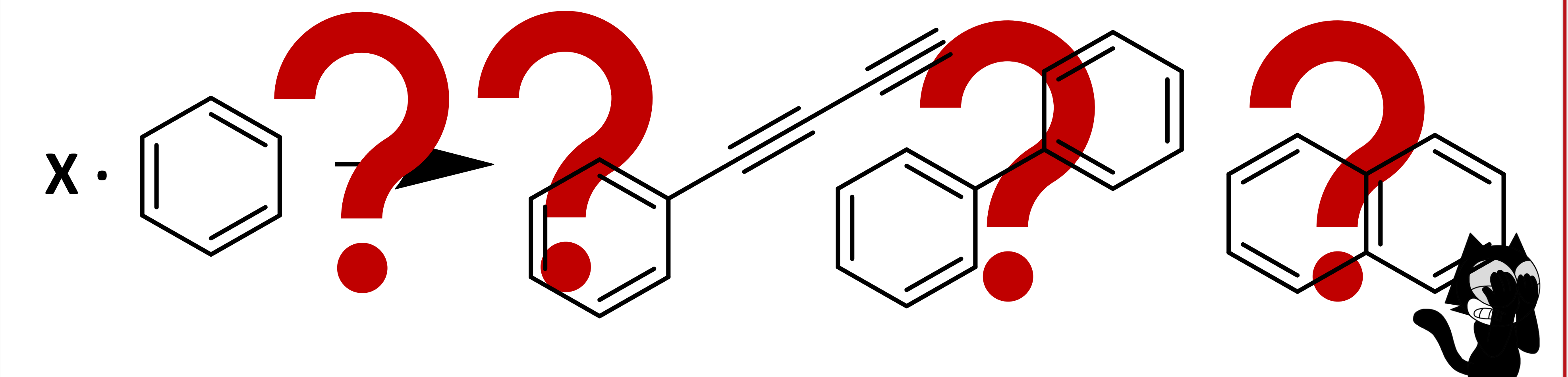


- Chemistry in cold regions of the **interstellar medium (ISM)** is not well understood
- **Plasma source** to identify new products, intermediates and to unravel reaction routes to PAHs
- **Find new species** for radio astronomy searches

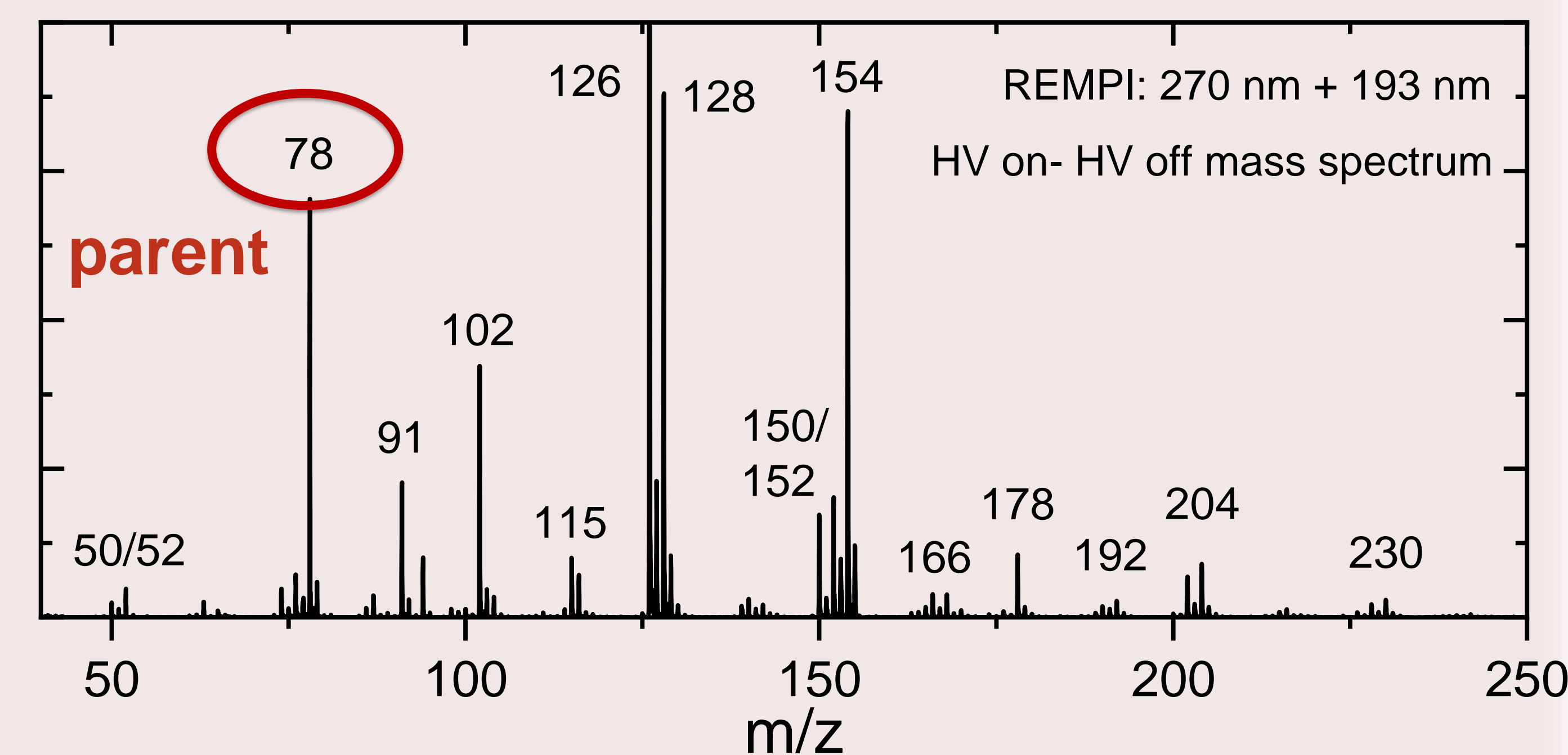


RESEARCH QUESTION

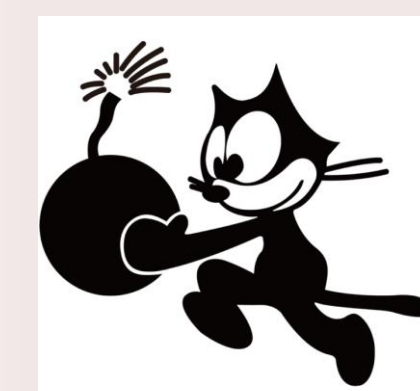
How are the PAH formation pathways interconnected?



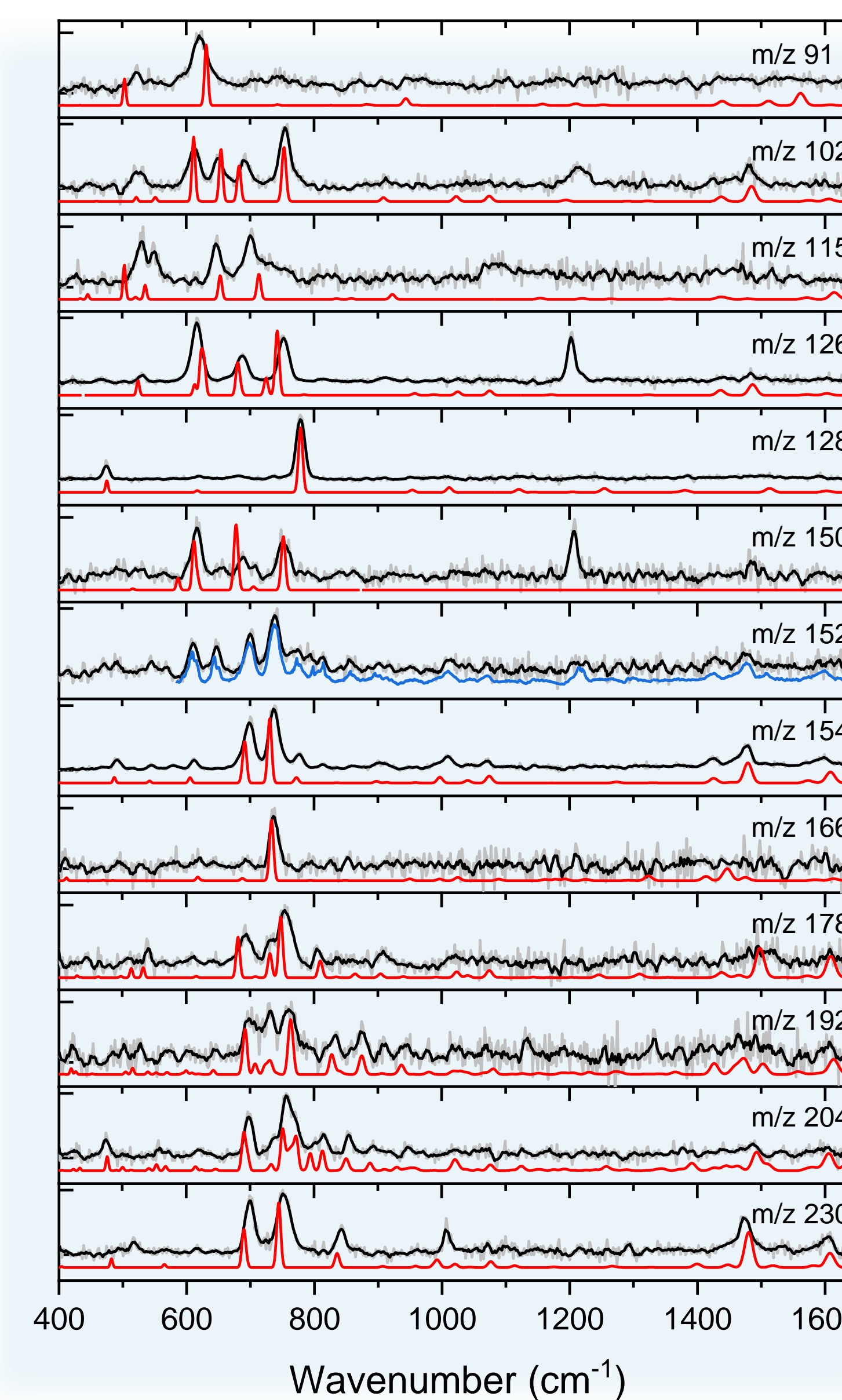
RESULTS



Many new, larger products formed



What's the structure?!

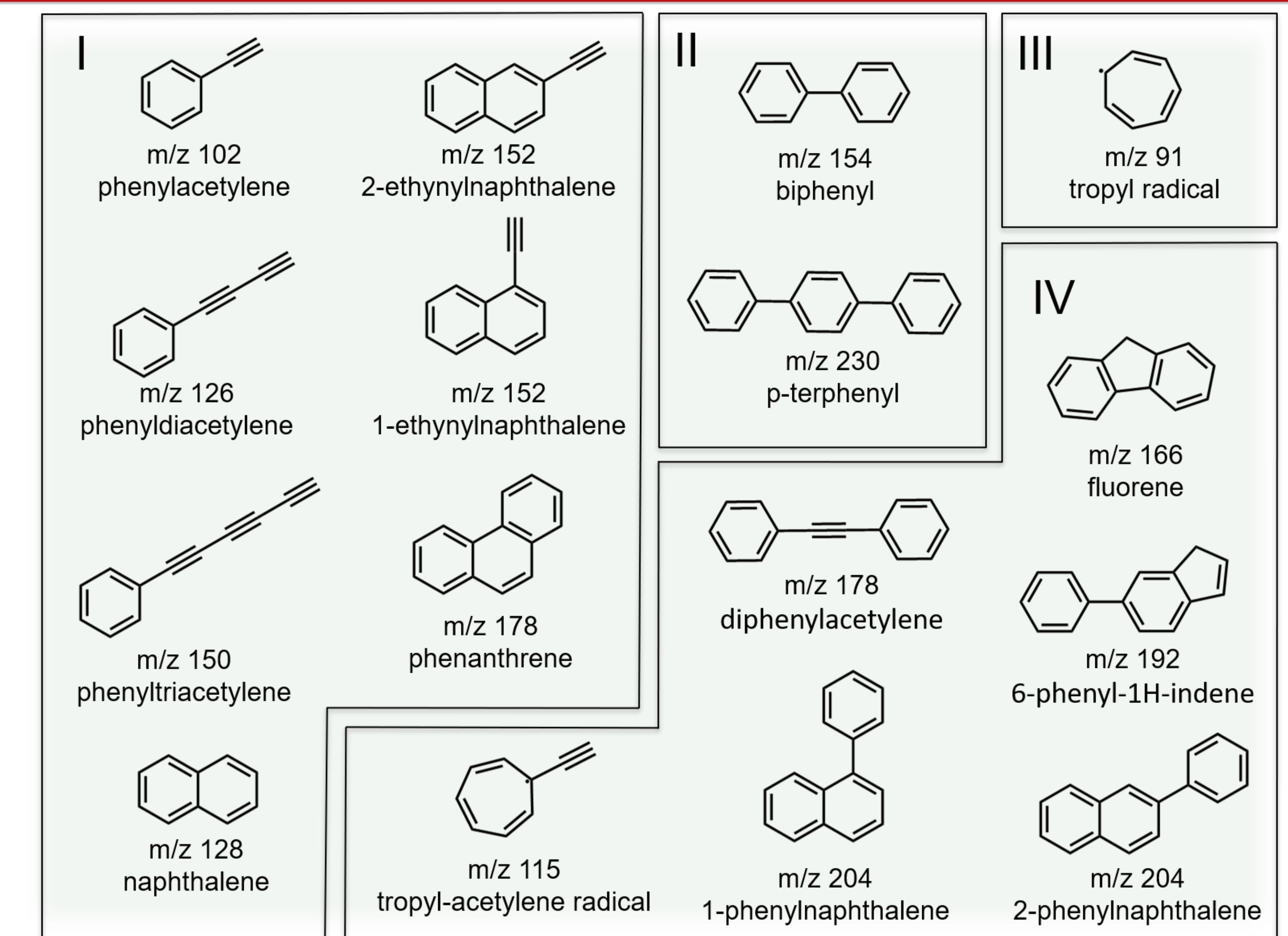


Structural assignment

Mass selective, gas-phase IR spectroscopy in the fingerprint region

combined with

quantum chemically predicted spectra



CONCLUSION

New identified species formed by a combination of mechanisms: HACA, PAC, Ring expansion and more! QC calculations show **submerged barriers**: possible in cold ISM



REFERENCE

Alexander K. Lemmens et al., Nature Comm., 11, 269 (2020)
Alexander K. Lemmens, Daniël B. Rap et al., in preparation